ABSTRACT OF THE DISCLOSURE

Memory storage devices that employ atomic resolution storage technology are provided. A preferred memory storage device includes a storage medium that defines one or more coverage areas. Each of the coverage areas incorporates a storage area that is configurable in one of a plurality of structural states. Typically, the structural states represent information stored in the storage area. Electron beam emitters electrically communicate with the storage medium, with the storage medium and the emitters being configured to move relative to each other. So configured, each emitter is capable of providing a beam of electrons to a respective one of the coverage areas. The memory storage device also includes a first current source that selectively electrically communicates with at least one of the emitters. Additionally, a control system electrically communicates with the first current source that facilitates a controlled current flow from the first current source to the at least one emitter. Methods and computer readable-media also are provided.